

## CYLINDER LOW/MEDIUM-FREQUENCY CRYSTAL UNIT

## C-2-TYPE C-4-TYPE C-TYPE

Product number (please refer to page 1)

Q12C2000xxxxx00

Q11C001Rxxxxx00

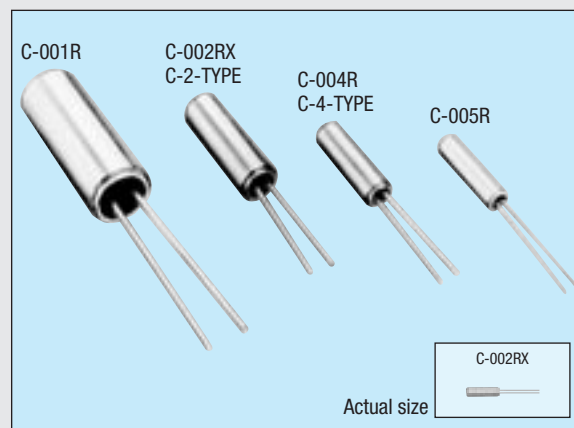
Q11C004Rxxxxx00

Q12C4000xxxxx00

Q11C02RXxxxxx00

Q11C005Rxxxxx00

- Photolithography finished allows uniform and stable performance.
- Excellent environmental capability.
- Respond to an extensive range of frequency, from 20 kHz to 165 kHz, and 307.2 kHz. (C-2-TYPE), from 32 kHz to 120 kHz and 307.2 kHz (C-4-TYPE)
- Available for complete lead (Pb)-free product.



## ■ Specifications for C-2-TYPE C-4-TYPE (characteristics)

Item	Symbol	Specifications		Remarks
		C-2-TYPE	C-4-TYPE	
Nominal frequency range	f	20.000 kHz to 165.000 kHz, 307.2 kHz	32.000 kHz to 120.000 kHz, 192 kHz	Please refer to frequency example page 14
Temperature range	Storage temperature	-20 °C to +70 °C		Stored as bare product after unpacking
	Operating temperature	-10 °C to +60 °C		
Maximum drive level	GL	1.0 μW Max.		
Frequency tolerance (standard)	Δf/f	$\pm 20 \times 10^{-6}$ , $\pm 50 \times 10^{-6}$ , $\pm 100 \times 10^{-6}$ (307.2 kHz $\pm 100 \times 10^{-6}$ )	$\pm 50 \times 10^{-6}$ , $\pm 100 \times 10^{-6}$	Ta = +25 °C, DL = 0.1 μW
Peak temperature (frequency)	θT	+25 °C $\pm 5$ °C		
Temperature coefficient (frequency)	a	-0.04 x 10 <sup>-6</sup> / °C <sup>2</sup> Max.		
Load capacitance	CL	6 pF to ∞		Please specify
Series resistance	R <sub>1</sub>	55 kΩ to 6 kΩ	50 kΩ to 10 kΩ	As per below table
Motional capacitance	C <sub>1</sub>	4.0 fF Max.	3.0 fF Max.	
Shunt capacitance	C <sub>0</sub>	2.0 pF Max.	1.5 pF Max.	
Insulation resistance	IR	500 MΩ Min.		
Aging	fa	$\pm 5 \times 10^{-6}$ / year Max.		Ta = +25 °C $\pm 3$ °C, first year
Shock resistance	S.R.	$\pm 5 \times 10^{-6}$ Max.		Three drops on a hard board from 750 mm or excitation test with 29400 m/s <sup>2</sup> x 0.3 ms x 1/2 sine wave x 3 directions

## ■ Series resistance C-2-TYPE

Frequency (kHz)	20 kHz ≤ f < 31.2 kHz	31.2 kHz ≤ f < 40 kHz	40 kHz ≤ f < 90 kHz	90 kHz ≤ f < 130 kHz	130 kHz ≤ f ≤ 165 kHz	307.2 kHz
Series resistance (Ω)	55 kΩ Max.	35 kΩ Max.	20 kΩ Max.	12 kΩ Max.	10 kΩ Max.	6 kΩ Max.

## ■ Series resistance C-4-TYPE

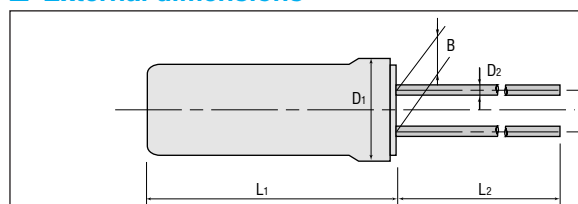
Frequency (kHz)	32 kHz ≤ f < 38 kHz	38 kHz ≤ f < 50 kHz	50 kHz ≤ f < 74 kHz	74 kHz ≤ f < 100 kHz	100 kHz ≤ f ≤ 120 kHz	192 kHz
Series resistance (Ω)	50 kΩ Max.	30 kΩ Max.	25 kΩ Max.	22 kΩ Max.	15 kΩ Max.	10 kΩ Max.

## ■ Series resistance C-TYPE

Item	Symbol	C-001R	C-002R	C-004R	C-005R	Remarks
Nominal frequency range	f		32.768 kHz			
Temperature range	Storage temperature	-20 °C to +70 °C				
	Operating temperature	-10 °C to +60 °C				
Maximum drive level	GL	1.0 μW Max.				
Frequency tolerance (standard)	Δf/f	$\pm 20 \times 10^{-6}$				Ta = +25 °C, DL = 0.1 μW
Peak temperature (frequency)	θT	+25 °C $\pm 5$ °C				
Temperature coefficient (frequency)	a	-0.04 x 10 <sup>-6</sup> / °C <sup>2</sup> Max.				
Load capacitance	CL	6 pF to ∞				Please specify
Series resistance	R <sub>1</sub>	35 kΩ Max. (18 kΩ Typ.)	50 kΩ Max. (30 kΩ Typ.)	50 kΩ Max. (37 kΩ Typ.)		
Motional capacitance	C <sub>1</sub>	2.1 fF Typ.	2.0 fF Typ.	1.9 fF Typ.		
Shunt capacitance	C <sub>0</sub>	0.9 pF Typ.	0.85 pF Typ.	0.75 pF Typ.		
Insulation resistance	IR	500 MΩ Min.				
Aging	fa	$\pm 3.0 \times 10^{-6}$ / year Max.				Ta = +25 °C $\pm 3$ °C, first year
Shock resistance	S.R.	$\pm 5 \times 10^{-6}$ Max.				Three drops on a hard board from 750 mm or excitation test with 29400 m/s <sup>2</sup> x 0.3 ms x 1/2 sine wave x 3 directions

## ■ External dimensions

(Unit: mm)



Model	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>
C-001R	8.0 Max.	9.0 Min.	ø3.1 Max.	ø0.3	1.1
C-002RX C-2-TYPE	6.0 Max.	4.0 Min.	ø2.0 Max.	ø0.2	0.7
C-004R C-4-TYPE	5.0 Max.	4.0 Min.	ø1.5 Max.	ø0.2	0.5
C-005R	4.6 Max.	4.0 Min.	ø1.2 Max.	ø0.15	0.3